

Ecobiol®

Stabilizing the gut flora –
with probiotics

Ecobiol®



NATURAL BALANCE

Typical causes of intestinal microbial imbalance include the high variability in the quality of raw feed materials, leading to an increase in undigested nutrients in the intestinal lumen. This in turn can trigger an overgrowth of *Clostridium perfringens* in the gut (dysbiosis), causing inflammation and oxidative stress. The resulting environment enables growth of other opportunistic bacteria such as *Escherichia coli*.

This imbalance in the microbial population causes disruption of the intestinal barrier and diarrhea, both responsible for economic losses due to reduced growth rates and increased medication costs. In addition, the control of *Salmonella spp.* in poultry continues to be a public health concern.

Finally, the development of multiple bacterial resistance to different antibiotics increases the need for alternative measures to control *Clostridium perfringens* and *Salmonella spp.*





Our Probiotic Solution

Ecobiol® consists of a natural fast-growing *Bacillus amyloliquefaciens* CECT 5940 strain with an inherent capacity to produce secondary metabolites and lactic acid, which can influence interactions between different bacterial populations.

By promoting the symbiotic relationship between nutrition, gut microbiota and immunity, Ecobiol® can potentially improve the overall health status of the animals and help producers to solve quality, profitability and sustainability challenges, such as food safety and low performance.

How it works

The way that Ecobiol® maintains an equilibrated intestinal environment lies in its capacity to react to the environment, mainly through *quorum sensing* and *quorum quenching*.

Depending on the signals received, *Bacillus amyloliquefaciens* CECT 5940 (Ecobiol®) produces macrolactins or lactic acid. Macrolactins are molecules, secondary metabolites with a strong inhibitory activity against pathogens. Lactic acid, an organic acid, supports cross-feeding of other beneficial bacteria, enhancing resistance to enteropathogenic bacteria.

Ecobiol® works through *quorum quenching*

Bacteria communicate among each other through the production of different specific molecules, a phenomenon termed *quorum sensing* (QS), as depicted in **Figure 1**. One of the known “communicator” molecule groups is N-acyl-homoserine lactone (AHL), which sends bacteria a message to become more virulent, produce toxins, invade cells, etc.

Blocking communication among these pathogenic bacteria is called *quorum quenching* (QQ), and can reduce the impact of this communication, as shown in **Figure 2**.

Figure 1: How does *quorum sensing* work?

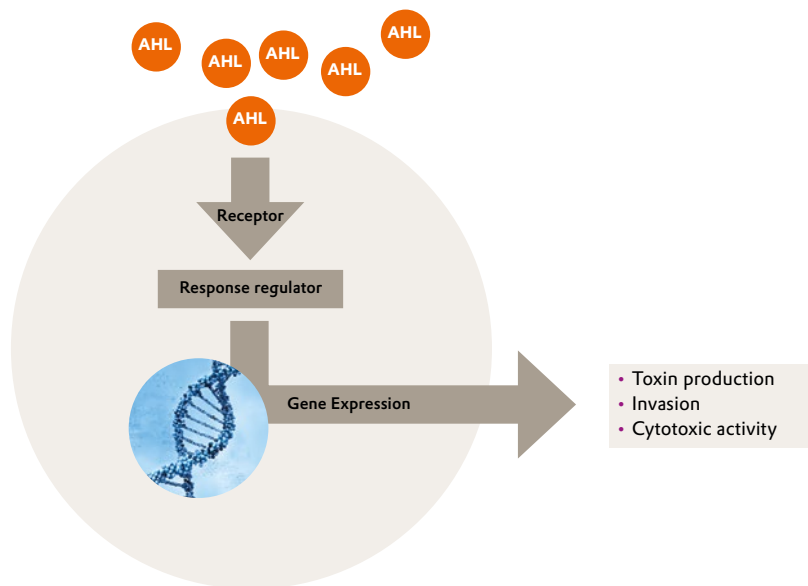
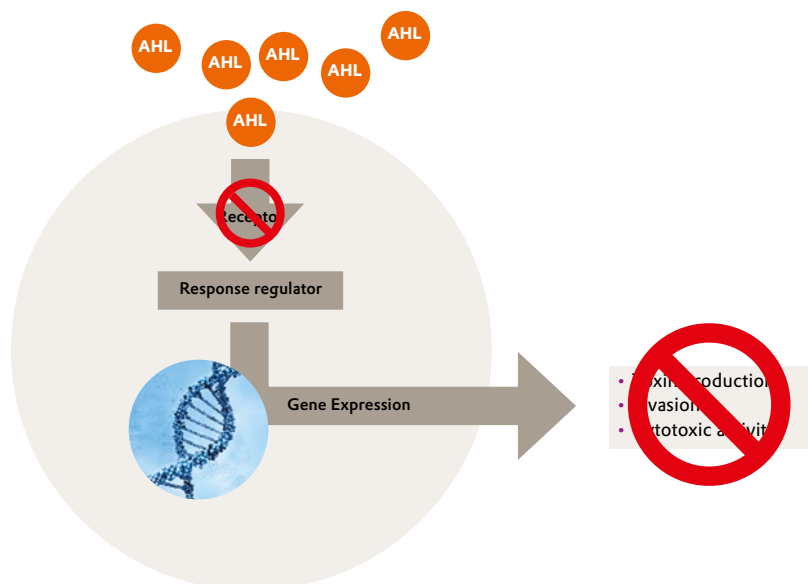


Figure 2: How does *quorum quenching* work?



In vitro activity

Ecobiol® has proven to have a significant *in vitro* activity against different *Clostridium perfringens* strains*.

Table 1: In vitro efficacy

Well diffusion assay using strains grown in Caso/Hefe media (mm clearance of pathogen)

	<i>C. perfringens</i> type A (NE outbreak field isolates)	<i>C. perfringens</i> (Library collection)
	(τ -toxin)	(τ - and netB-toxin)
ATCC 13124		
Ecobiol®	23	26

Figure 3:

Diffusion assay proving Ecobiol® efficacy against *C. perfringens**

Bacillus spp.
(competitor)

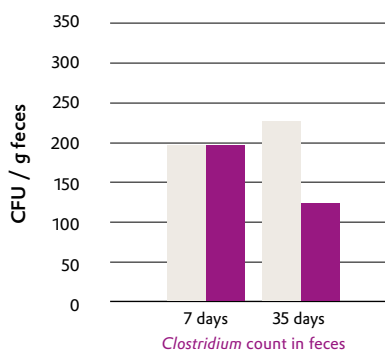
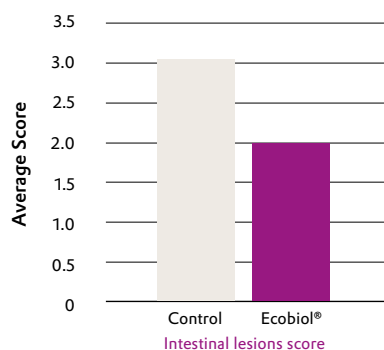
Media
(negative control)

Ecobiol®

C. perfringens ATCC 13124

*Results of internal studies- Unpublished data.

Figure 4: In vivo efficacy



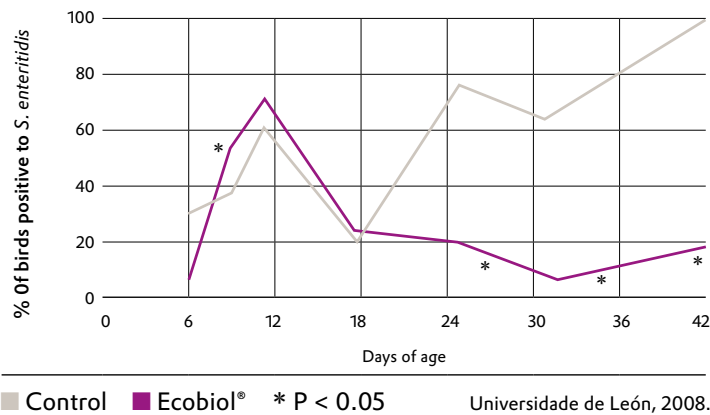
■ Control ■ Ecobiol®

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Ecobiol® has proven to have positive effects in animal trials

Ecobiol® efficacy *in vivo*, reducing gut lesions caused by *Clostridium perfringens* and shedding in feces, shown in Figure 4.

Figure 5: Infection level reduction



Ecobiol® proved to significantly reduce levels of *S. enteritidis* in broiler chickens after 42 days in production, as shown in Figure 5.

While Ecobiol® reduces pathogenic bacteria *in vitro* and *in vivo*, it supports the proliferation of beneficial bacteria such as lactobacilli, as shown in Figure 6 from an *in vivo* broiler trial.

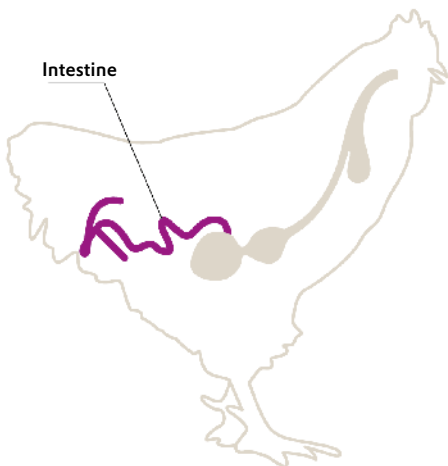


Figure 6: Increase of beneficial bacteria (lactobacilli)

Ecobiol® sustained the growth of lactobacilli in different stages of creation

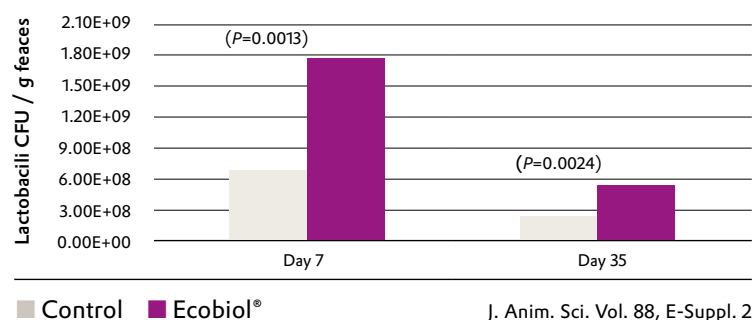
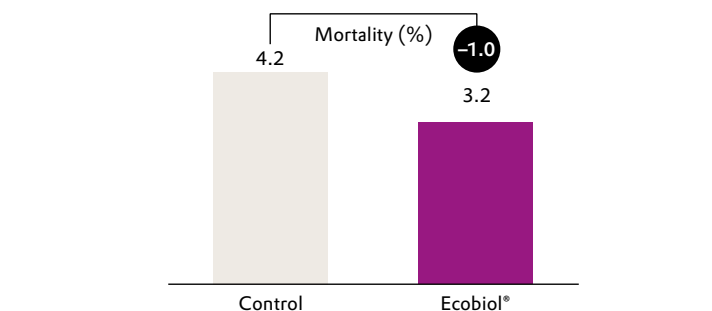


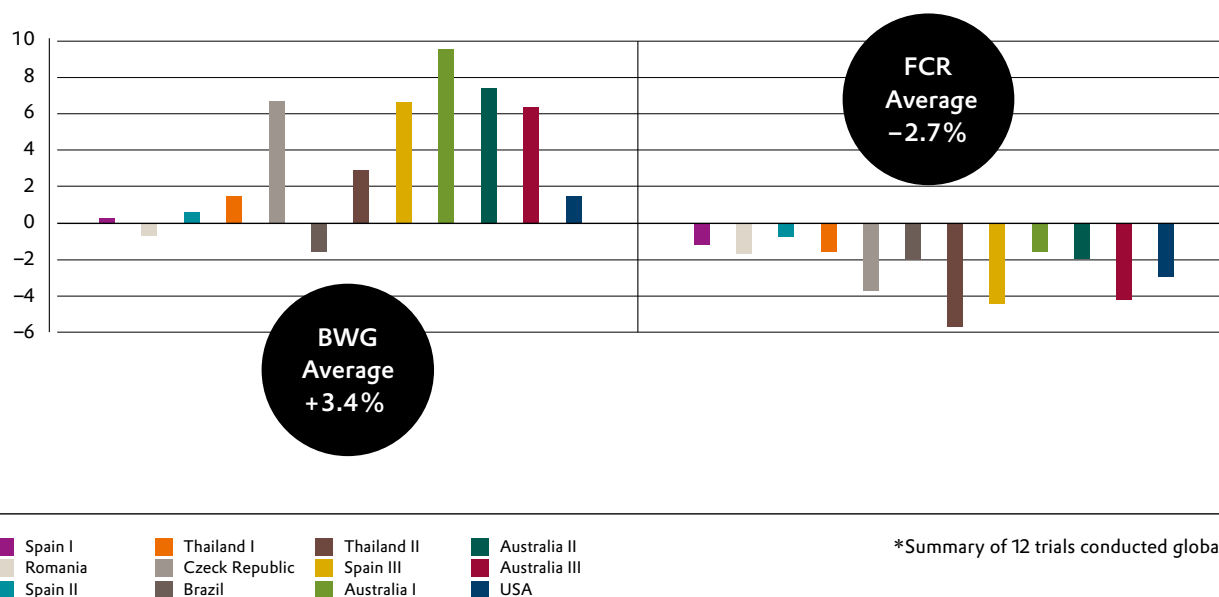
Figure 7: Decreased Mortality*



*Summary of 8 trials conducted globally

Mortality was decreased by 1% in average with Ecobiol®, shown in Figure 7.

Figure 8: Improved Performance*



Ecobiol® improved feed conversion ratio (FCR) and body weight gain (BWG), as shown in **Figure 8**.

Designed for flexibility

For easy use, the effective probiotic solution is compatible with other feed additives such as coccidiostats, AGP or organic acids and is available in different forms in order to support in feed, premix and water applications.*

How to use it

Ecobiol® can be combined with your current existent practices. Ecobiol® is compatible with other feed additives such as coccidiostats, AGP, organic acids.

Strain Properties

- Natural spore forming bacteria
- Resistant to temperatures up to 90 °C for 1 minute
- Resistant to low pH and bile
- Fast germination and growth rate
- Proven mechanism of action: *Bacillus amyloliquefaciens* CECT 5940, has the capacity to produce:
 - > Macrolactins and other specific secondary metabolites
 - > Lactic acid
 - > Quorum quenching

Benefits

- Survives feed manufacturing processes
- Easy to handle by workers at feed mills and farms
- Ecobiol® persists in the gut for at least 3 days, ensuring an extended benefit to the host
- Favors growth of resident (beneficial) microbiota, such as lactobacilli
- Reduces the threat of having opportunistic bacteria colonizing the gut

* Certain statements may not be applicable in all geographical regions. Product labeling and associated claims may differ based upon government requirements. Product names and or availability may vary by country.

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